

Name: MARKING SCHEME Adm. No: Class:

232/3
PHYSICS
PAPER 3
(PRACTICAL)
JULY 2025
TIME: 2½ HOURS.

Index No.....

Candidate's sign.

Date:

MOKASA II EXAMINATION

INSTRUCTIONS TO CANDIDATES:

- a) Write your; **NAME, ADM. NO** and **CLASS** in the spaces provided above.
- b) Sign and write the date of examination in the spaces provided above.
- c) Answer **all** the questions in the spaces provided in the question paper.
- d) You are supposed to spend the first **15 minutes** of the **2 ½ hours** allowed for this paper reading through the whole paper carefully before commencing your work
- e) Marks are awarded for a clear record of the observation actually made, their suitability, accuracy and the use made of them.
- f) Candidates are advised to record their observations as soon as they are made.
- g) Non programmable Silent Electronic calculators and mathematical tables may be used.
- h) Candidates should answer the questions in English.

FOR EXAMINER'S USE ONLY.

Question 1	b	c	e	f	g (i)	g (ii)
Maximum Score	1	6	5	3	3	2
Candidate's Score						

Total

20

Question 2	iii	iv	v	vi	a	b
Maximum Score	2	1	1	7	1	5
Candidate's Score						

Total

20

GRAND TOTAL

40

*This paper consists of 9 printed pages;
 Candidates are advised to check the question paper to ascertain that all the pages are printed and that no page is missing.*

QUESTION ONE

You are provided with the following apparatus;

- A Stirrer
- Stand , a boss and a clamp
- A thermometer
- An Ammeter
- A voltmeter
- A beaker (250 ml)
- A source of boiling water
- Two dry cells in a cell holder
- A switch
- Seven connecting wires
- A component labeled X

Proceed as follows

(a) Set up the circuit as shown in the figure 1 below

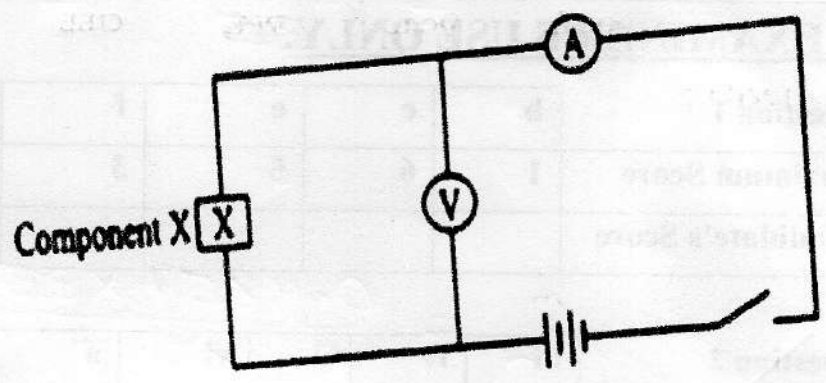


Figure 1

(i) Close the switch; read and record the current I through the component X and the potential difference V across it.

I $0.20\text{ A} \pm 0.05$ ✓
 V $1.30\text{ V} \pm 0.1$ ✓

without units
 Deny 2 marks

(1 mark)
 (1 mark)

Open the switch.

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(ii) Determine the resistance R of component X, at room temperature; given that

$$R = \frac{V}{I} = \frac{1.30}{0.20} \quad \text{Subst} - \sqrt{\frac{1}{2}} \quad (1 \text{ mark})$$

$$= 6.50 \Omega \quad \text{Answer with units} \quad \sqrt{\frac{1}{2}}$$

Set up the apparatus as shown in the figure 2 below and pour hot water into the beaker so that the component X and the thermometer bulb are fully immersed.

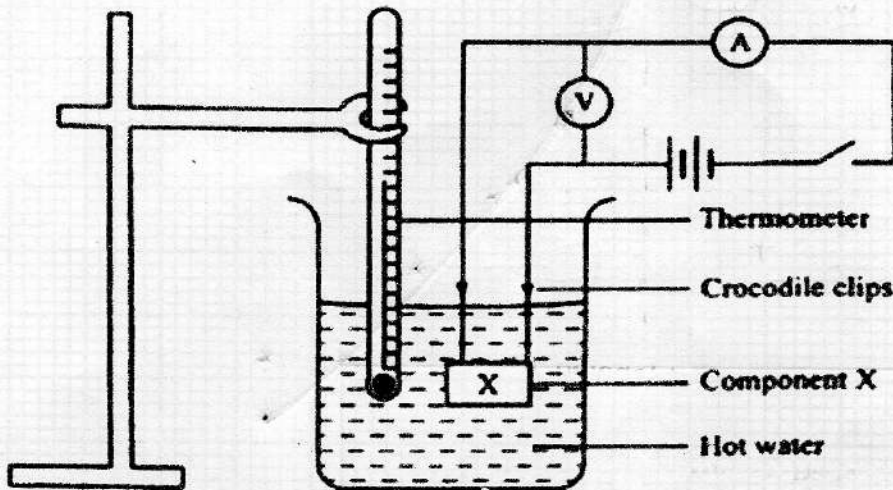


Figure 2

(b) Stir the water from time to time, when the temperature falls to 75°C . Switch on the circuit, read and record the current I and the potential difference V in table 1. Then open the switch.

(c) Repeat part (c); as the temperature falls to the other values shown in table 1 and complete the table 1 below.

Table 1

(7 marks)

Temperature of hot water ($^\circ\text{C}$)	75	70	65	60	55	50
Temperature in Kelvin (K)	348	343	338	333	328	323
Current I (A)	0.30	0.27	0.27	0.28	0.28	0.26
Voltage (V)	0.70	0.70	0.80	0.90	1.00	1.10
Resistance $R = \frac{V}{I}$ (Ω)	2.333	2.593	2.963	3.214	3.571	4.231

✓ (au) correct

± 0.01

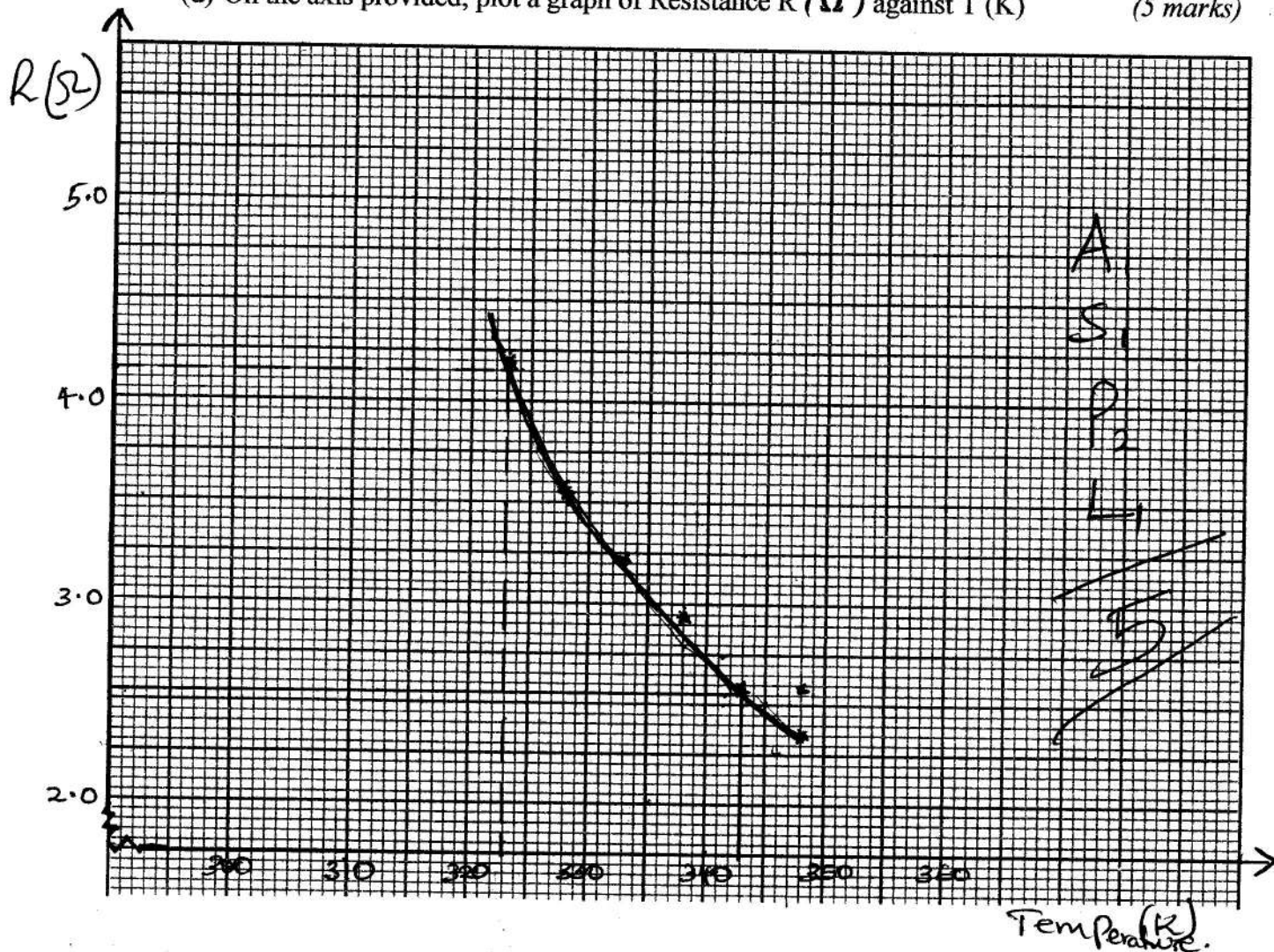
Table 1

All correct

✓ 1

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(d) On the axis provided, plot a graph of Resistance R (Ω) against T (K) (5 marks)



(e) From your graph; determine the following values of R ; for the given temperatures

(i) R_1 ; when $T_1 = 323\text{K}$

$R_1 = 4.15 \Omega$ - must be shown on graph. (1 mark)

(ii) R_2 ; when $T_2 = 343\text{K}$

$R_2 = 2.55 \Omega$ (must be shown on graph) (1 mark)

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(iii) Hence find the value of β given that $\beta = \frac{\ln\left(\frac{R_1}{R_2}\right)}{\left(\frac{1}{T_1} - \frac{1}{T_2}\right)}$ (2 marks)

$$\beta = \frac{\ln\left(\frac{4.15}{2.55}\right)}{\frac{1}{323} - \frac{1}{343}} = \frac{0.4870}{1.8052 \times 10^{-4}} \quad \text{Substitution} \checkmark$$

$$= 2697.76$$

Answer \checkmark

(f) What **conclusion** can we draw from the graph above.

(1 mark)

Resistance decreases with an increase in temperature. \checkmark

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QUESTION TWO

Part One 2(a);

You are provided with the following apparatus:

- A Complete Stand
- A stop watch
- A meter rule
- A spiral spring
- One 50 g mass
- Two 100 g masses
- Two pieces of wood/ Tying string

Proceed as follows

- (a) Hang the spring vertically by clamping one end as shown in figure 3 below using the two pieces of wood

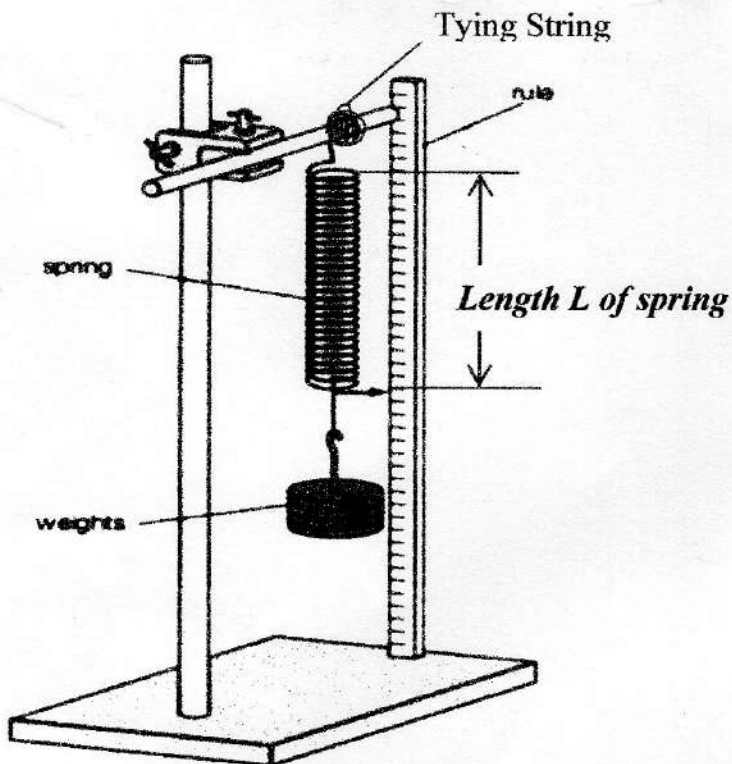


Figure 3

- (b) Measure the length of the *un-loaded spring*, L_0

$$L_0 = \underline{4.5 \pm 0.5} \text{ cm}$$

(1 mark)

(c) Hang 100g mass and measure the length of the **loaded spring**, L

$$L = \underline{13.6 \pm 0.5} \text{ cm}$$

(1 mark)

(d) Extension $e = \underline{9.1 \pm 0.5} \text{ cm}$

(1 mark)

(e) Determine the spring constant K of the spring

$$K = \frac{F}{e} = \frac{1.0}{9.1} = 0.1099 \text{ N/cm}$$

(1 mark)

Working must be shown.

(f) Displace the 100g mass by a small vertical displacement and release so that it makes vertical oscillations. Record the time for 20 oscillations and record in the table below

(5 marks)

Mass m (g)	100	150	200
Mass, m(Kg)	0.10	0.150	0.200
Time for 20 oscillations(s)	12.78	15.48	17.94
Periodic time, t(s)	0.639	0.774	0.897
$T^2(s^2)$	0.4083	0.5990	0.8046

✓
± 0.5 ✓
✓
✓

(f) Repeat (e) above with the other masses in the table. Complete the table

(g) Determine the average value of T^2

(1 mark)

$$= \frac{0.4083 + 0.5990 + 0.8046}{3}$$

$$= 0.6039 \text{ s}^2$$

Averaging must be shown.

(h) Hence determine the value of g , given that; $g = \frac{4\pi^2 \times 0.150}{T^2}$

(1 mark)

$$g = \frac{4\pi^2 \times 0.150}{0.6039}$$

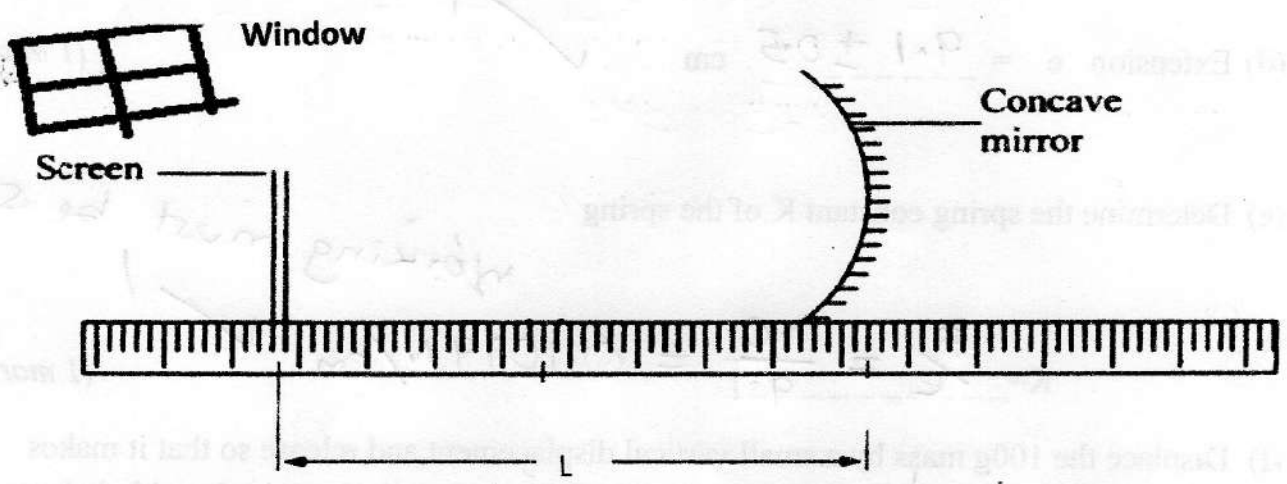
$$= 9.8048 \text{ m/s}^2$$

(substitution shown)

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Part Two (2b)

By focusing a distant object e.g. a window as shown in the figure below; move the screen to and fro until a sharp image is formed on the screen.

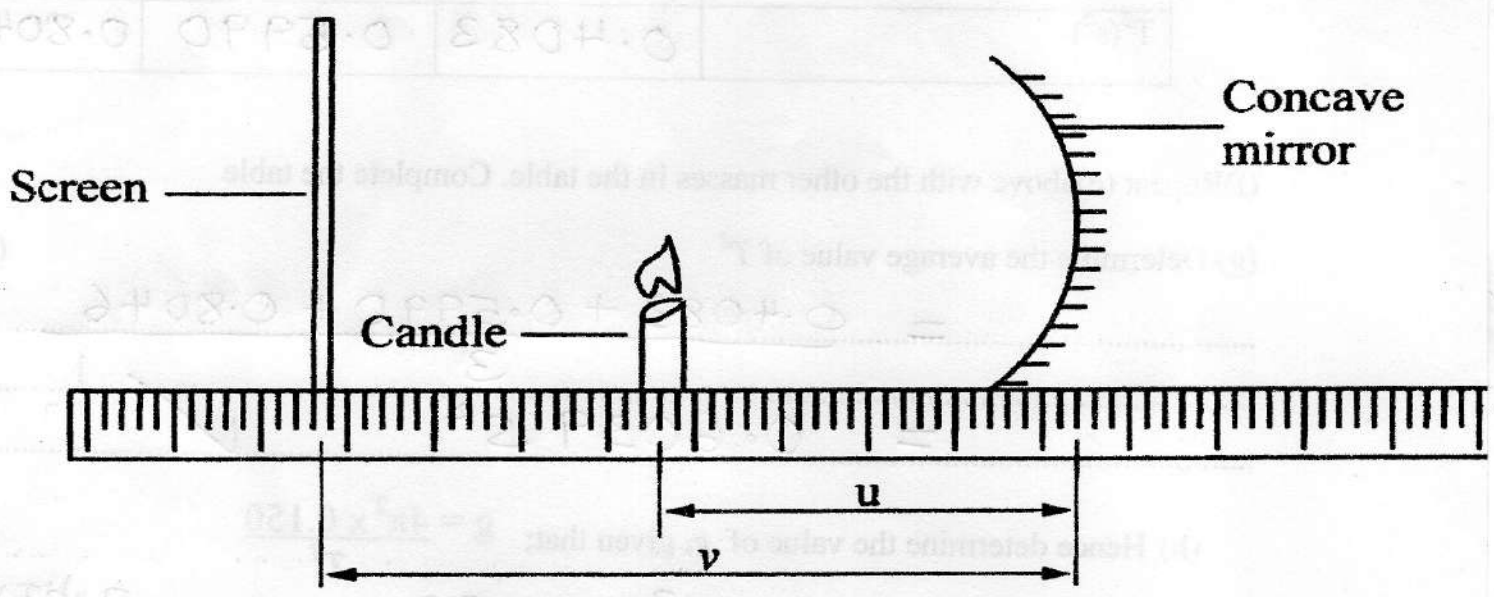


Measure the distance l between the mirror and the screen

(i) $l = \dots\dots\dots 19.0\text{cm} \pm 2.0 \dots\dots\dots$ (1 mark)

Light the candle and place it in between the mirror and screen as shown in the diagram below.

Set the distance $u = 25\text{cm}$ and adjust the position of the screen until a sharp image of the candle flame is obtained



(ii) Read and record the distance v between the screen and the mirror.

$v = \dots\dots\dots 61.5\text{cm} \pm 2.0 \dots\dots\dots$ (1 mark)

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- (iii) Determine the magnification m of the mirror given that $m = \left(\frac{v}{u}\right)$ (1 mark)

$$M = \frac{61.5}{25} = 2.46 \quad \checkmark$$

(Working must be shown)

- (iv) Calculate the value of f_1 given that; (1 mark)

$$f_1 = \frac{mu}{m+1} = \frac{2.46 \times 25}{2.46 + 1} = 17.77 \text{ cm}$$

(Working must be shown)

Repeat the above part for $u = 35 \text{ cm}$

- Read and record the value of $v_1 = 34.5 \text{ cm} \pm 2.0$ (1 mark)

- (v) Determine the magnification m_1 of the mirror (1 mark)

$$M = \frac{34.5}{35} = 0.9857 \quad \checkmark$$

(Working must be shown)

- (vi) Hence find the value of f_2 (1 mark)

$$f_2 = \frac{0.9857 \times 35}{0.9857 + 1} = 17.374$$

(Working must be shown)

- (vii) Determine the average value of f (2 marks)

$$f = \frac{17.77 + 17.374}{2} = 17.572 \text{ cm.} \quad \checkmark$$

This is the last printed page